LETTER OF TRANSMITTAL W&W Engineering, LLC

130 West Summer Street, Suite 3
Greeneville, TN 37743
tone: 423-638-2770 Fax: 423-638-8615

				Phone: 423-638-2770	Fax:	423-638-8615		
To:	-			ronment &				
		servation			Date: 9	0/2/16	Job #: 16-18	
	Wa	ter Polluti	ion Cor	ntrol	A 44 - 14	an a Ma Malanda	11.1. d	
	W /31	liom D C	nodoro	ss Tennessee Tower	Attention: Mr. Mahendra Uphadyaya RE: City of Church Hill, TN			
	312	Rosa I. J	nougra Parks A	venue, 11 th Floor	KL.	Sewer Line Exte		
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	Nas	hville, TN	V 3722	1		i i i i i i i i i i i i i i i i i i i		
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We ar	e sen	ding you:	2	K Attached 🗆 1	Under se	parate cover via	the following ite	ms:
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5				Plans & Technical Sp	pecifica	tions	- C	EII.
1				Design Report			STATE OF ST	EIVED
1				Review fee Form and	d Check	for \$25	TN DEPT. OF	7
		M		The San Line		the sales of	N DEPT. OF FA	2016
These	are tr	ansmitted	as chec	ked below:	, N , 1 , 1		VISION OF WASE	RVANNENT
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Copy	to:			*	Signed:	Cathy Walden Ky	ker, PE	

WPN16-0730

FOR SEWER LINE EXTENSION WEST MORGAN STREET CITY OF CHURCH HILL HAWKINS COUNTY, TN

#16-18

AUGUST, 2016

WPN16-0730



W & W ENGINEERING, LLC 800 WEST ANDREW JOHNSON HIGHWAY SUITE 2 GREENEVILLE, TENNESSEE 37745 PHONE # 423-638-2770 The City of Church Hill has a gravity sewer line on West Morgan Street that serves several homes. There is one home at the end of the street and one vacant lot that cannot be served by the gravity line. The home currently has a septic tank installed but the system has failed and the homeowner now wants to connect to public sewer. A pump will need to be installed to service the home. This project includes the installation of a pressure sewer line to serve this home and the home to be constructed in the future on the vacant lot. There are already a few homes within the City that are serviced by individual pumps. This installation will follow the city's current policy. A pump (meeting the requirements of the City) will be purchased and installed at the homeowner's expense. It will be equal to the Hydromatic 2 HP grinder pump used in these calculations.

The high point of the force main from the pumps is at the manhole where the pressure line will connect. The flow from this line is estimated as follows:

2 homes x
$$250 \text{ GPD}$$
 x 2.5 peaking factor = 0.87 GPM
24 hr x 60 min

This will be negligi

ble to the existing lines and will not adversely impact them. The individual grinder pumps' flow rate will be more than this and will vary depending on the number of pumps operating simultaneously, the system head for each pump, etc.

The calculations were done using attached Charts (to establish pipe flow and for velocity and head loss) published by Hydromatic Pump Company. The calculations were made from the farthest pump on the line (the vacant lot) since it will have to be able to pump all the way to the manhole. Flow rates, velocity, line size, line lengths, static heads, and number of pumps are listed below for this line.

Line Size	Length	Cumulative # of Pumps	Cumulative Flow in Section	Head Loss per 100 feet	Head Loss _in section	Static Head	Velocity
2	224	2	25 gpm	1.01'/100'	2.26	15'	2.17 fps
Total Head = 2	2.26 + 1.	5 = 17.26					

Total head loss for pump on vacant lot (lowest elevation and farthest distance) is 17.26.

This is less than the capacity of the 2 hp grinder (which has a shut-off head of 105 feet).

Obviously, if the head went higher, the flow rate would reduce and the flow rate in pipe would be less reducing the head loss because of friction. This design is conservative.

The existing lines and the proposed lines in the subdivision will be adequate.

Cathy Kyker, PE W & W Engineering

TABLE VIII

SUGGESTED DESIGN FLOWS FOR 250 GPD AVERAGE DAILY FLOW

(3.5 People Per Dwelling) (71.5 GPD Per Capita)

No. of Dwellings	Total Av. Flow (GPD)	GPM Av. Flow (GPM)	Peak to Av. Flow Ratio	Peak Flow (GPM)	Suggested Design Flow (GPM)
1	250	.174	4.46	.777	15
5	1,250	.870	4.39	3.82	30
10	2,500	1.73	4.35	7.53	
20 ,	5,000	3.47	4.28	14.90	45
30	7,500	5.21	4.24	22.10	
40	10,000	6.94	4.20	29.15	
50	12,500	8.67	4.17	36.10	45
60	15,000	10.40	4.14	43.00	
70	17,500	12.13	4.11	50.00	Þ
80	20,000	13.86	4.09	56.70	65
90	22,500	15.59	4.06	63.30	
100	25,000	17.35	4.04	70.20	75
110	27,500	19.08	4.02	76.70	
120	30,000	20.82	4.01	83.50	90
130	32,500	22.55	3.99	90.00	
140	35,000	24.28	3.98	96.60	100
150	37,500	26.01	3.96	103.10	
160	40,000	27.74	3.94	109.30	115
170	42,500	29.47	3.92	115.80	
1.80	45,000	31.20	3.91	122.00	125
190	47,500	32.94	3.90	128.50	
200	50,000	34.67	3.89	134.90	140
210	52,500	36.40	3.88	141.10	
220	55,000	38.13	3.87	147.50	
230	57,500	39.87	3.86	154.00	160
240	60,000	41.60	3.84	160.00	
250	62,500	43.33	3.83	166.00	
260	65,000	45.06	3.82	172.10	175
270	67,500	46.80	3.81	178.50	
280	70,000	48.54	3.81	185.40	
290	72,500	50.27	3.80	191.50	
300	75,000	52.00	3.79	197.00	200

The suggested design flows in the last column of Tables 5 through 11 represent a suggested interpolation at random intervals to facilitate line sizing and hydraulic calculations. In the lower range of accumulative homes (under 100) the influence of the storage-pumping action of the contributing units, when compared to the calculated peak flow, will determine the most acceptable lowest suggested design flow to use.

FLOW CHART FOR PVC SDR-21 PIPE (Flow Coefficient C-150)

							7.9		8.55 0.16	6.35 6.16	4.03 .902
							7.6	-		5.35 6.16	
							7.9			5.35	6.16
						+++	7.3		4	4.57	5.35
									7.33 4.57		4.57
						+	6.7	4	6.72 3.88	3.88	3.88
_						-			6.11 3.16	3.16	3.16
-					9.47	+	10.63	10.63 5.60	10.63 5.60	10.63 5.60 2.67	10.63 6.60 2.67 2.42
					8.42			8.39 4.69	8.39 4.69	8.39 4.69 2.13	8.39 4.69 2.13 2.15
					7.37		6.48	6.48 4.27	6.48	6.48 4.27 1.68	6.48 4.27 1.68
					6.31		4.85	4.05 3.06	4.85	4.05 3.06	4.85 3.86 1.26
		7.6	7.63	7.63 8.50		8.50 5.26	8.50 5.26 3.49	8.50 5.26	8.50 5.26 3.49	8.50 5.26 3.49 3.05 .901	8.50 5.26 3.49 3.05 .901
		6.1	6.10	6.10 5.56	_	5.56 4.21	5.56 4.21 2.27	5.56 4.21 2.27 2.44	5.56 4.21 2.27	5.56 4.21 2.27 2.44 .589	5.56 4.21 2.27 2.44 .589
7.83	7.83 11.15	11.15	11.15 5.49	11.15	11.15 5.49	11.15 5.49 4.55 3.79	11.15 5.49 4.55 3.79 1.87	11.15 5.49 4.55 3.79 1.87 2.20	11.15 5.49 4.55 3.79 1.87	11.15 5.49 4.55 3.79 1.87 2.20	11.15 5.49 4.55 3.79 1.87 2.20
6.96	6.96 8.97	8.97	8.97 4.88	8.97	8.97 4.88	8.97 4.88 3.66 3.36	8.97 4.86 3.66 3.36 1.49	8.97 4.88 3.66 3.36	8.97 4.86 3.66 3.36 1.49	8.97 4.88 3.66 3.36 1.49 1.96	8.97 4.88 3.66 3.36 1.49 1.96
6.10	6.10 6.91	6.91	6.91 4.27	6.91	6.91 4.27	6.91 4.27 2.86 2.95	6.91 4.27 2.86 2.95 1.17	6.91 4.27 2.86 2.95 1.17 1.70	6.91 4.27 2.86 2.95 1.17	6.91 4.27 2.86 2.95 1.17 1.70	6.91 4.27 2.86 2.95 1.17 1.70
18,40 5.22		5.22 5.16	5.22 5.16 3.66	5.22 5.16	5.22 5.16 3.66	5.22 5.16 3.86 2.12 2.52	5.22 5.16 3.66 2.12 2.52 .861	5.22 5.16 3.66 2.12 2.52 .801 1.46	5.22 5.16 3.66 2.12 2.52 .861	5.22 5.16 3.66 2.12 2.52 .801 1.46	5.22 5.16 3.66 2.12 2.52 .801 1.46
12.87 4.35	_	4.35 3.65	4.35 3.65 3.05	4.35 3.65	4.35 3.65 3.05	4.36 3.65 3.05 1.51 2.10	4.35 3.65 3.05 1.51 2.10 525	4.35 3.65 3.05 1.51 2.10 525 1.22	4.35 3.65 3.05 1.51 2.10 525	4.35 3.65 3.05 1.51 2.10 525 1.22	4.35 3.65 3.05 1.51 2.10 525 1.22
10.53 3.91	_	3.91 3.00	3.91 3.00 2.75	3.91 3.00	3.91 3.00 2.75	3.91 3.00 2.75 1.20 1.89	3.91 3.00 2.75 1.20 1.89 .519	3.91 3.00 2.75 1.20 1.89 .519 1.09	3.91 3.00 2.75 1.20 1.89 .519	3.91 3.00 2.75 1.20 1.89 .519 1.09	3.91 3.00 2.75 1.20 1.89 .519 1.09
	3.48	3.48 2.43	3.48 2.43	3.48 2.43 2.44	3.48 2.43 2.44	3.48 2.43 2.44 .998 1.68	3.48 2.43 2.44 .998 1.68 .417	3.48 2.43 2.44 .998 1.88 .417 .980	3.48 2.43 2.44 .998 1.68 .417	3.48 2.43 2.44 .998 1.88 .417 .980	3.48 2.43 2.44 .998 1.88 .417 .980
6.56 3.05	_	3.05 1.09	3.85	3.05 1.09	3.05 1.89 2.14	3.05 1.89 2.14 .786 1.47	3.05 1.89 2.14 .788 1.47 .327	3.05 1.89 2.14 .788 1.47 .327 .855	3.05 1.89 2.14 .788 1.47 .327	3.05 1.89 2.14 .788 1.47 .327 .855	3.05 1.89 2.14 .788 1.47 .327 .855
99 2.61	_	2.61 1.41	2.61 1.41	2.61 1.41 1.83	2.61 1.41 1.83 .589				1.4.		
48 2.17	10.07				200	2.61 1.41 1.83 .589 1.26	2.61 1.41 1.83 .589 1.26	2.61 1.41 1.83 .589 1.26	2.61 1.41 1.83 .589 1.26	2.61 1.41 1.83 .589 1.26	2.61 1.41 1.83 .589 1.26
	2.17	1.01	2.17 1.01	2.17 1.01 1.53	2.17 1.01 1.53 .421	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26
231 1.74	2.17	1.74 .675 2.17 1.01	1.74 .675 2.17 1.01	1.74 .675 1.22 2.17 1.01 1.53	1.74 .675 1.22 .285 2.17 1.01 1.53 .421 1	1.74 .675 1.22 285 .841 2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	1.74 .675 1.22 .285 .841 2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	1.74 .675 1.22 .285 .841 2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	1.74 .675 1.22 .285 .841 2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	1.74 .675 1.22 .285 .841 .2.17 1.01 1.53 .421 1.05 .2.61 1.41 1.83 .589 1.26	1.74 .675 1.22 .285 .841 .2.17 1.01 1.53 .421 1.05 .2.61 1.41 1.83 .589 1.26
231	231 1.74	2.31 1.74 .675 1 3.48 2.17 1.01 1	2.31 1.74 .675 1.22 3.48 2.17 1.01 1.53	2.31 1.74 .675 1.22 3.48 2.17 1.01 1.53	2.31 1.74 .675 1.22 .285 3.48 2.17 1.01 1.53 .421 1	1.30 1.30 .402 .919 .109 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.30 1.30 A42 313 103 2.31 1.74 .875 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.30 1.30 .402 .913 .109 2.31 1.74 .875 1.22 .295 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .295 .941 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26
+	1.36 1.30 2.31 1.74 3.48 2.17 1	1.36 1.30 .402 2.31 1.74 .675 1 3.48 2.17 1.01 1	1.36 1.30 .402 .919 2.31 1.74 .875 1.22 3.48 2.17 1.01 1.53	1.36 1.30 .402 .919 2.31 1.74 .675 1.22 3.48 2.17 1.01 1.53	1.36 1.30 .402 .919 .169 2.31 1.74 .675 1.22 .285 3.48 2.17 1.01 1.53 .421 1	1.36 1.30 .402 .919 .169 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.36 1.30 .402 .919 .169 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.36 1.30 .402 .919 .169 2.31 1.74 .875 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.36 1.30 A02 919 .169 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .588 1.26	1.36 1.30 A02 919 .169 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	1.36 1.30 A02 919 .169 2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26
231	231 1.74	2.31 1.74 .675 1 3.48 2.17 1.01 1	2.31 1.74 .675 1.22 3.48 2.17 1.01 1.53	2.31 1.74 .675 1.22 3.48 2.17 1.01 1.53	2.31 1.74 .675 1.22 .285 3.48 2.17 1.01 1.53 .421 1	2.31 1.74 .675 1.22 .285 .841 .3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 .3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 .348 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 3.48 2.17 1.01 1.53 .421 1.05 4.89 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 .3.48 2.17 1.01 1.53 .421 1.05 .489 2.61 1.41 1.83 .589 1.26	2.31 1.74 .675 1.22 .285 .841 .3.48 2.17 1.01 1.53 .421 1.05 .489 2.61 1.41 1.83 .589 1.26
	2.17	2.17 1.01	2.17 1.01	2.17 1.01 1.53	2.17 1.01 1.53 .421	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26	2.17 1.01 1.53 .421 1.05 2.61 1.41 1.83 .589 1.26
	3.05	2.61 1.41 3.05 1.89 3.48 2.43	3.05 1.89 3.49 2.43	2.61 1.41 1.83 3.05 1.89 2.14 3.46 2.43 2.44	3.05 1.89 2.14 .788 3.48 2.43 2.44 .998	3.05 1.89 2.14 .788 1.47 3.49 2.43 2.44 .998 1.68	3.49 2.43 2.44 .998 1.68 .417	3.05 1.89 2.14 .788 1.47 .327 .855 3.49 2.43 2.44 .998 1.88 .417 .980	3.05 1.89 2.14 .786 1.47 .327 .855 3.49 2.43 2.44 .998 1.88 .417 .980	3.05 1.89 2.14 .786 1.47 .327 .855 . 3.49 2.43 2.44 .998 1.88 .417 .980	3.05 1.89 2.14 .788 1.47 .327 .855 3.49 2.43 2.44 .998 1.88 .417 .980
8 10 22 8 9 8 8 9 9		1.41 1.89 2.43 3.00 3.65 5.16 6.91	1.41 1.83 1.89 2.14 2.43 2.44 3.00 2.75 3.65 3.06 5.16 3.66 6.91 4.27 8.97 4.58	1.41 1.83 1.89 2.14 2.43 2.44 3.00 2.75 1 3.65 3.06 1 5.16 3.86 2 6.91 4.27 2 8.97 4.88 3	1.09 2.14 .788 2.43 2.44 .998 3.00 2.75 1.20 3.65 3.06 1.51 5.16 3.66 2.12 6.91 4.27 2.86 8.97 4.88 3.66	1.69 2.14 .786 1.47 2.43 2.44 .996 1.68 3.00 2.75 1.20 1.89 3.65 3.05 1.51 2.10 5.16 3.86 2.12 2.52 6.91 4.27 2.86 2.95 1 8.97 4.86 3.66 3.36 1	1.89 2.14 .788 1.47 .327 2.43 2.44 .998 1.88 .417 3.00 2.75 1.20 1.89 .519 1 3.65 3.05 1.51 2.10 .925 1 5.16 3.66 2.12 2.52 .881 1 6.91 4.27 2.86 2.95 1.17 1 6.97 4.58 3.66 3.36 1.49 1	1.89 2.14 .788 1.47 .327 .855 2.43 2.44 .998 1.68 .417 .980 3.00 2.75 1.20 1.99 .519 1.09 3.65 3.05 1.51 2.10 .25 1.22 5.16 3.66 2.12 2.52 .801 1.46 6.91 4.27 2.86 2.95 1.17 1.70 6.97 4.89 3.66 3.38 1.49 1.96	1.69 2.14 .786 1.47 .327 .855 2.43 2.44 .998 1.88 .417 .980 3.00 2.75 1.20 1.89 .519 1.09 3.65 3.05 1.51 2.10 .925 1.22 5.16 3.86 2.12 2.52 .891 1.46 6.91 4.27 2.86 2.95 1.17 1.70 8.97 4.88 3.66 3.38 1.49 1.96	1.89 2.14 .788 1.47 .327 .855 2.43 2.44 .998 1.68 .417 .980 3.00 2.75 1.20 1.89 .519 1.09 3.65 3.05 1.51 2.10 .25 1.22 5.16 3.66 2.12 2.52 .891 1.46 6.91 4.27 2.86 2.95 1.17 1.70 6.97 4.89 3.66 3.38 1.49 1.96	1.89 2.14 .788 1.47 .327 .855 2.43 2.44 .998 1.68 .417 .980 3.00 2.75 1.20 1.89 .519 1.09 3.65 3.05 1.51 2.10 .625 1.22 5.16 3.66 2.12 2.52 .891 1.46 6.91 4.27 2.86 2.95 1.17 1.70 6.97 4.80 3.66 3.36 1.49 1.96
	1.41 1.49 1.89 2.43 3.00 3.65 5.16 6.91 11.15		1.83 2.14 2.44 2.75 3.06 3.66 4.27 4.89 5.49 6.10	1.83 2.14 2.75 1 3.05 1 3.86 2 4.27 2.75 1 3.86 2 5.49 4.27 2.70 3.86 2.70 5.49 4.27 2.70 3.86 3.86 3.86 3.86 3.86 3.86 3.86 3.86	1.83 5.69 2.14 .788 2.44 .998 2.75 1.20 3.05 1.51 3.66 2.12 4.27 2.86 4.89 3.66 5.49 4.55 6.10 5.56	2.14 .788 1.47 2.44 .998 1.89 2.75 1.20 1.89 3.05 1.51 2.10 3.86 2.12 2.52 4.27 2.86 2.95 1 4.88 3.66 3.38 1 5.49 4.55 3.79 1 6.10 5.56 4.21 2 7.03 8.50 5.26 3	2.14 .788 1.47 .327 2.44 .998 1.88 .417 2.75 1.20 1.89 .519 1 3.05 1.51 2.10 .625 1 3.86 2.12 2.52 .861 1 4.27 2.86 2.95 1.17 1 4.89 3.66 3.38 1.49 1 5.49 4.55 3.79 1.87 2 6.10 5.56 4.21 2.27 2 7.63 8.50 5.26 3.49 3	2.14 .788 1.47 .327 .855 2.44 .998 1.88 .417 .980 2.75 1.20 1.09 .519 1.09 3.05 1.51 2.10 .925 1.22 3.86 2.12 2.52 .801 1.48 4.27 2.86 2.95 1.17 1.70 4.88 3.66 3.38 1.49 1.96 5.49 4.55 3.79 1.87 2.20 6.10 5.56 4.21 2.27 2.44 7.63 8.50 5.26 3.49 3.05	2.14 .788 1.47 .327 .855 2.44 .998 1.68 .417 .980 2.75 1.20 1.89 .519 1.09 3.05 1.51 2.10 .925 1.22 3.66 2.12 2.52 .861 1.46 4.27 2.86 2.95 1.17 1.70 4.89 3.66 3.38 1.49 1.96 5.49 4.55 3.79 1.87 2.20 6.10 5.56 4.21 2.27 2.44 7.63 8.50 5.26 3.49 3.05	2.14 .786 1.47 .327 .855 .089 2.44 .998 1.68 .417 .980 .113 2.75 1.20 1.89 .519 1.09 .139 3.06 1.51 2.10 .625 1.22 .164 3.66 2.12 2.52 .861 1.46 .232 4.27 2.86 2.95 1.17 1.70 .310 4.80 3.86 3.30 1.49 1.96 .390 5.49 4.55 3.79 1.87 2.20 .486 6.10 5.56 4.21 2.27 2.44 .589 7.63 8.50 5.26 3.49 3.05 .901	2.14 .788 1.47 .327 .855 .089 2.44 .998 1.68 .417 .980 .113 2.75 1.20 1.89 .519 1.09 .139 3.06 1.51 2.10 .625 1.22 .184 3.66 2.12 2.52 .801 1.46 .232 4.27 2.86 2.95 1.17 1.70 .310 4.80 3.66 3.30 1.49 1.96 .390 5.49 4.55 3.79 1.87 2.20 .486 6.10 5.56 4.21 2.27 2.44 .589 1.07 7.03 8.50 5.26 3.49 3.05 .901 1.35
	.998 1.88 .417 .980 .113 1.20 1.89 .519 1.09 .139 1.51 2.10 .525 1.22 .184 2.12 2.52 .801 1.46 .232 2.86 2.95 1.17 1.70 .310 3.66 3.36 1.49 1.96 .390 4.55 3.79 1.87 2.20 .486 5.56 4.21 2.27 2.44 .589 1.07 6.50 5.26 3.49 3.05 .901 1.35 6.50 5.26 3.49 3.05 .901 1.35 7.37 6.48 4.27 1.58 1.93 8.42 8.39 4.69 2.13 2.15	8 1.88 .417 .980 .113	417 980 .113 .519 1.09 .139 .519 1.09 .139 .519 1.09 .139 .601 1.46 .232 .147 1.70 .310 .1487 2.20 .486 .2.27 2.44 .589 1.07 .078 .349 3.05 .901 1.36 .119 .4.05 3.66 1.26 1.92 .167 .6.48 4.27 1.58 1.89 .221 .6.39 4.09 2.13 2.15 282 .10.63 5.50 2.57 2.42 .351 .10.63 5.60 2.57 2.42 .351 .10.63 5.60 2.57 2.42 .351 .20 6.72 3.89 2.95 .507 .20 7.33 4.57 3.23 .597 <td>.980 .113 </td> <td>.980 .113</td> <td>1.133</td> <td>1.07 .078 1.36 .119 1.82 .167 1.88 .221 2.15 .282 2.42 .351 2.89 .423</td> <td>.078 .119 .167 .221 .282 .282 .351 .423</td> <td></td> <td>1.39</td> <td></td>	.980 .113	.980 .113	1.133	1.07 .078 1.36 .119 1.82 .167 1.88 .221 2.15 .282 2.42 .351 2.89 .423	.078 .119 .167 .221 .282 .282 .351 .423		1.39	

SEP 02 '04 14 57 FROM: PENTAIR PUMP

HYDROMATIC® HPGR200

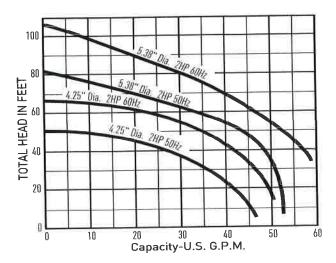
Pump Characteristics

Pump/Motor Unit	Submersible-Grinder		
Hertz	60 Hz / 50 Hz		
Phase	10		
Voltage	230		
Horsepower	2 HP		
Full Load Amps	12,5/15		
Motor Type	Oil Cooled Induction		
	Capacitor Start		
R P.M	2900/3450		
Тетр	140° F Ambient		
Operation	Intermittent		
Thermal Overload	Bi-Metallic		
Temperature	Max Water 140° F		
NEMA Design	Туре А		
Insulation	Class F		
Discharge Size	1 1/4" NPT		
Unit Weight	95 lbs		
Power Cord	Type SJOW/SJOW-A Water Resistant 600 V, 60° C CSA/UI Approved 20° Ft. Std.		

Materials of Construction

Part Name	Material
Motor Housing	Cast Iron ASTM-48
Pump Casing	Cast Iron ASTM-48
Coolant/Lubricant	Dielectric Oil
Shaft	Stainless Steel
Mechanical	Seal Faces: Carbon/Ceramic Shaft Seal Seal Body: Stainless Steel Spring: Stainless Steel Bellows: Buna-N
Impeller	High Strength Valox 420SEO with Bronze Insert
Cutters	440C Hardened 55-60 Rockwell C
Upper Bearing	Single Ball Bearing
Lower Bearing	Single Ball Bearing
Fasteners	Stainless Steel

Performance Data



Dimensional Data





All dimensions in inches. Metric for international use.
Component dimensions may vary ± 1/8 inch.
Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product and their specifications without notice.



USA

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Because we are continuously improving our products and services, Pentair reserves the right to change specifications without prior notice.